

**REBUILD HAWAII**

**HAWAII PERFORMANCE CONTRACTING WORKSHOP 2003**

# Hawaii ESPC Projects

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What has Been Done  
& Lessons Learned

City & County of Honolulu



# Honolulu Hale

## Scope

- City Hall and Annex Buildings
- Central Cooling Plant & Cogeneration System
- Lighting Retrofit - Office & Historic
- AHU Replacements / Upgrades
- City LAN Networked Building Control System

## Financing

- Bond - Energy Program Funded
- Electric Utility Rebates

## Status

- Central Plant/ Lighting Completed 6/02
- Cogeneration Unit online planned for 4/03



# Honolulu Hale

## Benefits

- Improved work environment with additional cooling capacity, temperature control and better lighting.
- New reliable equipment
- Flexible Equipment Scheduling
- Data for Commissioning / Diagnostic Work
- 39% reduction in energy usage

## Lessons

- Adapted existing Contracts Administration methods (design / construction / services)

## Improvements

- Include C&C CAD & Construction standards
- “One-Time Review” building permit procedures

City & County of Honolulu



# Traffic Signal Systems

## Scope

- Over 400 Intersections on Oahu
- LED Signal Module Retrofit (Red / Green)
- TraffiCenter Lighting Retrofit

## Financing

- Bond - Energy Program Funded
- Electric Utility Rebates

## Status

- Completed 10/02

City & County of Honolulu



# Traffic Signal Systems

## Benefits

- Improved Public Safety
- Increase productivity through reduced maintenance and emergency call outs
- 45% reduction in overall energy usage
- Correction of Metering/Billing issues

## Lessons

- Contractors with Task Specific Experience
- Close installation coordination to resolve existing condition situations in the field.

## Improvements

- Independent Consultant to review ECMs
- Equipment & Construction Subcontractor Bidding
- Utilize the Availability of Third-Party Financing

County of Hawaii



# County Building

## Scope

- New Chillers
- Re-configured Chilled Water Plant Piping
- Schedule & Bypass Control
- Airflow Improvement in Council Chambers
- Energy-Efficient Lighting Retrofit

## Financing

- Self-Funded - Energy Program
- 10 years - Municipal Lease

## Status

- Completing 6 years of Guarantee

County of Hawaii



# County Building

## Benefits

- Improved & More Reliable Air Conditioning & Lighting Systems
- Replaced existing Breakdown Maintenance with full-service Preventative Maintenance
- Flexible Time Scheduling
- Significant Energy Usage & Demand Reduction

## Lessons

- Be very clear with how Rebates will apply



# Phase I & II

## Scope

- **Energy-Efficient Lighting for Police & Fire Facilities throughout the Big Island**
- **New Chiller Plants at Hilo & Kona Police Stations. Some new Air Handlers.**
- **Improved Air Conditioning Control at Hilo & Kona Police Stations**

## Financing

- **10 yr. - Self-Funded - Municipal Lease - Energy Programs w/ Additional work funded by Bond**

## Status

- **Ph. I - Completing 3 years of Guarantee**
- **Ph. II - Completed 1 year of Guarantee**





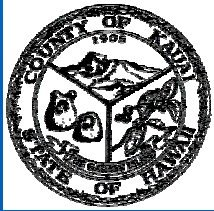
# Phase I & II

## Benefits

- Improved & More Reliable Air Conditioning & Lighting Systems
- Replaced existing Breakdown service with full-service Preventative Maintenance
- Significant Energy Usage & Demand Reduction
- Solved Hilo Dispatch Room A/C Deficiencies

## Lessons

- ESPC is a very positive way to improve infrastructure and save energy



# Various County Facilities

## Scope

- Energy-Efficient Lighting Retrofit throughout various locations
- Centralized controls at Civic Center

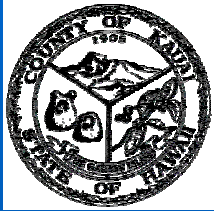
## Financing

- Self-Funded - Energy Program
- 10 years - Municipal Lease

## Status

- Finalized 10-year Payout based upon stipulated savings projection

County of Kauai



# Various County Facilities

## Benefits

- Improved work conditions
- Improved recreational conditions
- Improved reliability of lighting systems

## Lessons

- Maintenance Savings is pivotal in allowing for work in Wastewater and Water Departments
- Partnering is crucial

University of Hawaii Hilo



# University of Hawaii Hilo

## Scope

- University Campus with over 50 buildings
- Lighting Systems Retrofit
- High Efficiency Chiller / Tower / Pumping
- Mechanical Systems Repairs
- On-Site Building Specialist

## Financing

- 10 year Commercial Lease

## Status

- Completed 1997
- Ongoing Service until 2007

**Jun Haruki - Project Engineer**

Rebuild Hawaii -  
Hawaii Performance Contracting Workshop 2003

University of Hawaii Hilo



# University of Hawaii Hilo

## Benefits

- Improved Lighting Quality & Uniformity
- Greatly Reduced Service Backlog
- Chiller Loop Expansion (Campus Center & Student Services off of Air-Cooled Chillers)
- Improved environmental controls including remote scheduling

## Lessons

- Discussion of financing options early in Process
- Flexibility in dealing with operational issues

## Improvements

- Spend more time on maintenance scopes & roles
- Include Critical Systems Spares Review

**Jun Haruki - Project Engineer**

Rebuild Hawaii -  
Hawaii Performance Contracting Workshop 2003

University of Hawaii Community Colleges



# Kauai Community College

## Scope

- **New Chillers & Variable Primary Chilled Water Loop Pumping**
- **Improved Air Conditioning Control with central DDC System**
- **Power Factor Correction**

## Financing

- **Capital Funding**

## Status

- **Completing 3rd Year of Guarantee**

## University of Hawaii Community Colleges



# Kauai Community College

### Benefits

- Improved & More Reliable Air Conditioning Systems
- Replaced existing Breakdown service with full-service Preventative Maintenance
- Significant Energy Usage, Demand & Billing Reduction

### Lessons

- Never give up on Performance Contracting

University of Hawaii Community Colleges

# Honolulu Community College

## Scope

- **New Chillers, Pumps & Primary-Secondary Chilled Water Loop Pumping**
- **Improved Air Conditioning & Variable Speed Control with central DDC System**
- **Chemical-Free condenser water treatment**
- **New Window AC Occupancy Sensors**

## Financing

- **Capital Funding**

## Status

- **In 2nd Year of Guarantee**

**Dien Truong - Project Manager**

Rebuild Hawaii -  
Hawaii Performance Contracting Workshop 2003



University of Hawaii Community Colleges

# Honolulu Community College

## Benefits

- Improved & More Reliable Air Conditioning Systems
- Replaced existing Breakdown service with full-service Preventative Maintenance
- Energy Usage & Demand Reduction

## Lessons

- UH Procurement process requires patience



**HAWAII HEALTH SYSTEMS**

**C O R P O R A T I O N**

*"Touching Lives Everyday"*

#### Scope

- Healthcare System with ten facilities on five different islands.
- Cogeneration to meet 80% of facility electrical needs, 100% of facility hot water load, and supplement chilled water production via absorption chiller.
- Air conditioning system improvements include high efficiency chillers and variable volume chilled water operation.

#### Financing

- Customer furnished financing via municipal lease

#### Status

- Kona Community Hospital substantially complete. Chiller retrofit complete early 2002. Cogeneration system fully operational February 2003.



**HAWAII HEALTH SYSTEMS**

**C O R P O R A T I O N**

*"Touching Lives Everyday"*

**Status (cont'd)**

- **Hilo Medical Center 80% complete. Cogeneration system scheduled to go on line April 2003**
- **Kauai Veteran's Memorial Hospital 40% complete. Cogen system scheduled to go on line June 2003.**
- **Maui Memorial Medical Center and Samuel Mahelona Memorial Hospital in development.**

**Benefits**

- **Cogeneration systems provide for additional redundancy of electrical systems.**
- **New equipment (chillers, pumps, cooling towers, lighting, etc.) replaced aging equipment without capital funds expenditure.**
- **New energy management systems installed to allow for improved control and monitoring of electrical and mechanical systems throughout each facility.**



**HAWAII HEALTH SYSTEMS**

**C O R P O R A T I O N**

*"Touching Lives Everyday"*

#### Benefits (cont'd)

- Energy savings reduce demand on hospital electrical distribution system, providing additional expansion capacity.
- Comfort and maintenance problems reduced with upgrades to building and equipment.
- Positive cash flow throughout term of contract.

#### Lessons

- Economics of cogeneration are better with systems sized for electrical and thermal baseload.
- Synergistic benefits from combined effects of upgraded central plant, controls, and cooling load reduction.
- Detailed engineering uncovers unresolved problems in original design - Upgrades can improve performance.

## State of Hawaii - The Judiciary



# Judiciary Courthouses

### Scope

- Five Buildings on Maui and Oahu
- Over 500,000 square feet of Office, Meeting and Courtroom facilities
- Lighting Retrofit

### Financing

- 10 year Third-Party Municipal Lease

### Status

- Contract Award 10/02
- Construction Award 2/03



# Judiciary Courthouses

### Benefits

- Improve work environment with higher Lighting Levels and better color rendering
- Eliminate unoccupied lighting of rooms with Occupancy Sensors
- Reduce Maintenance requirements with standardization of lamp & ballasts.

### Lessons

- Participation in Team Meetings essential
- Building Manager /User Meetings
- Sample Retrofit was Beneficial

### Improvements

- Set internal deadlines for review/comments

## State of Hawaii - Department of Defense



# Hawaii Army National Guard

### Scope

- 40+ Facilities on Oahu, Big Island, and Kauai
- Lighting Retrofits
- Air Conditioning Plants
- Waste Heat Recovery for Hot Water Systems
- Photo-Voltaic Electrical Generation

### Financing

- Proposed Third-Party Municipal Lease
- Electric Utility Rebates

### Status

- Energy Audits Complete
- ECM selection and feasibility analysis

## State of Hawaii - Department of Defense



# Hawaii Army National Guard

### Benefits

- Need Capital Improvements to Replace Failing A/C systems
- Improved work environment with Upgrade of Lighting Systems
- Improve Site and Asset security with lighting systems
- Provide Central Control and monitoring of Energy and Environmental Conditions

### Lessons

- Full-time person needed to facilitate coordination with Multiple Users / ESCO



United States Air Force



# Hickam Air Force Base

## Scope

- **Two Task Orders:**
  - HVAC Equipment & Control Retrofit
  - Energy-Efficient Lighting Retrofit
  - Water Conservation
  - Radiant Barrier
  - Solar Attic Fans

## Financing

- **Self-Funded - Energy Program**

## Status

- **Task Order 1 - 2nd Year of Guarantee**
- **Task Order 2 - Implementation Complete Feb. '03**

United States Air Force



# Hickam Air Force Base

## Benefits

- Improved & More Reliable Air Conditioning Systems
- Improved control & diagnosis of Air Conditioning systems
- Improved comfort for residents
- Electricity, Water & Sewage - Usage & Demand Reduction

## Lessons

- 9/11 Affects Everything

United States Army Medical Command



# Tripler Army Medical Center

## Scope

- Chilled Water Pumping Improvements
- Hot Water Recirc. Loop Steam Heat Exchanger
- Chilled Water Loop Extension
- Air Handler Upgrades (VFD/Static/Motors)
- Computer Room DX to Chilled Water Cooling

## Financing

- 23 year Third-party Lease
- Utility Rebates

## Status

- Phase 1 Completed 1/03
- Phase 2 in Proposal Stage

# United States Army Medical Command



## Tripler Army Medical Center

### Benefits

- **Mission Critical Capital Improvements Funded by Energy Savings**
- **First Task Order Proved working relationship, worked out processes and demonstrated Improvements work**
- **Provided infrastructure for follow on projects**
- **Improved Exterior Aesthetic Conditions**

### Lessons

- **Vision of Facilities needs & goals communicated**
- **Trust and clear communications during project development**

### Improvements

- **Clearly define payment / funding processes**

United States Navy



# Naval Region Southwest

## Scope

- Approximately \$20 Million
- Technologies:
  - HID Lighting
  - Controls
  - HVAC
  - Micro-turbines
  - 750kW PV Array
  - Irrigation

## Financing

- ESPC
- State Incentives
- Office of the Secretary of Defense

United States Navy



# Naval Region Southwest

## Benefits

- Better Working Conditions
- No Capital Outlay for Projects
- Implement Innovative Projects
- Quality Projects

## Lessons

- The Activity Must Participate in the Process
  - Guide Audits
  - Decide What Qualifies as Savings
  - Involve Stakeholders Early in the Process
  - Take an Active Management & Review Role
  - Get Expert Help With M&V Planning / Execution
  - Plan Post Construction Roles for the Life of the Contract

**Chris Lippert**- Deputy Energy Program  
Manager, Tetra Tech EMI

Rebuild Hawaii -  
Hawaii Performance Contracting Workshop 2003

United States Marine Corps



# Marine Corps Base Hawaii

## Scope

- Bachelor housing and dining facilities
- Hot water from A/C waste heat recovery
- High-efficiency chiller
- Direct Digital Controls

## Financing

- \$2.3M ESPC financing
- \$1.2M Environmental funds (cost avoidance)
- HECO rebates

## Status

- Completed ~12/01
- Amortization to 3/08

United States Marine Corps



# Marine Corps Base Hawaii

## Benefits

- Demolition of 2 large steam plants
- Elimination of 4 boiler watchstander positions
- Avoid \$1.2M fuel spill containment costs
- Annual Savings: \$60K energy, \$306K maintenance, & \$218K operations

## Lessons

- Think “out of the box”, basic requirements
- Re-use waste energy instead of new energy

## Improvements

- Central control and monitoring of energy use



United States Marine Corps



# Marine Corps Base Hawaii

## Scope

- Lighting retrofit, 49 buildings
- Lighting retrofit, 350 family housing units
- Daylighting controls, 5 hangars
- A/C waste heat recovery, 6 bachelor housing buildings

## Financing

- \$1.7M ESPC financing
- HECO rebates

## Status

- Completed ~10/02
- Amortization to 10/12

United States Marine Corps



# Marine Corps Base Hawaii

## Benefits

- Better quality, more efficient lighting
- Lighting off when daylighting sufficient
- Recover waste heat for domestic hot water
- \$110K annual energy savings

## Lessons

- Re-use waste energy instead of new energy
- Include the “obvious” – reduce wattage of lighting controlled where feasible

## Improvements

- Central control and monitoring of energy use